to Australia, you add to the fauna in a greater proportion than you increase the area, and thus make the region seem richer. For a fair comparison continents should be compared with continents, and islands with islands, and these should in every case be brought to an approximate equality of area by lopping off outlying portions with their peculiar species. We shall then get results which will be instructive, and which will afford us a true estimate of the comparative richness of different countries in the several classes of animals and plants.

ALFRED R. WALLACE

### Mr. Crookes and Eva Fay

IN Dr. Carpenter's eagerness to show that his statements about Mr. Crookes and Eva Fay had some basis of fact, he seems entirely to have forgotten the real issue which he has himself raised, and which is of great importance to all engaged in the study of these tabooed subjects. The question simply is, whether *any* investigation of the alleged abnormal powers of individuals, however painstaking and complete it may be, and however decisive its results, is to be branded with opprobrious epithets, without any proof of error or fallacy, but merely on the dicta of newspaper writers and alleged "exposers."

In the case before us Mr. Crookes made certain experiments in his own laboratory, in which the greatest refinements of modern electrical science were employed; and of these he published a detailed account. That is the sum total of his acts and deeds in regard to Eva Fay. Yet because these experiments have been referred to in America as indorsing Eva Fay's remarkable powers, and because some persons charge her with being an impostor, and go through an alleged imitation of her performances, Dr. Carpenter accuses Mr. Crookes of encouraging "disgraceful frauds" and indorsing a "notorious impostor." Now it is clear that, to support this accusation, Dr. Carpenter must *prove* that Eva Fay was an impostor in respect to what happened *in Mr. Crookes's house*, and that, to use Dr. Carpenter's own words, she evaded his "scientific tests" by a "simple dodge." He must prove that Mr. Crookes exhibited culpable carelessness or incapacity in accepting, as conclusive, tests which were really fallacious; for, otherwise, how can Mr. Crookes be held responsible for anything which happened afterwards in America? Dr. Carpenter has promised to do this in the forthcoming new edition of his lectures; but as the accusation against Mr. Crookes has been made in the pages of NATURE, and the question is a purely scientific one—that of the absolute completeness of the test of "electrical resistance"—I call upon Dr. Carpenter to explain fully to the readers of NATURE the exact particulars of that "simple dodge" which is to destroy Mr. Crookes's reputation as a physical experimenter, and to sustain the reputation of his accuser. Unless the explanation is so clear and conclusive as to satisfy *all* the witnesses of the experiments that Eva Fay *did* evade the scientific tests, and that what they saw was simple conjuring, then Dr. Carpenter is bound to find a conjuror who will submit to the same tests as Eva Fay did, and produce the same phenomena before the eyes of the witnesses, so as to show "how it is done." Mr. Maskelyne, who professes to have exposed Eva Fay, will of course be ready to do this for an adequate remuneration, which I feel sure will be forthcoming if Dr. Carpenter is proved to be right and Eva Fay's "simple dodge" is clearly explained.

I have already shown (in this month's *Fraser*) that the supposed *exposure* of Eva Fay in America was no exposure at all, but a clumsy imitation, as will be manifest when it is stated that the exposer, Mr. Bishop, performed all his tricks by *stretching the cord* with which his hands were secured to the iron ring behind his back! There is hardly a greater exhibition of credulity on record than Dr. Carpenter's believing that *such a performer* proved Eva Fay to be an impostor and Mr. Crookes's experiments valueless. But what can we expect when we find a *Daily Telegraph* report quoted as an authority in a matter of scientific inquiry?

I venture to think that, whatever may be their opinions as to the amount of *fact* in the phenomena called "spiritualistic" (by Dr. Carpenter, but never by Mr. Crookes), all men of science will agree with me that Dr. Carpenter is bound to *prove by direct experiment* that Mr. Crookes and his coadjutors were the victims of imposture on the particular occasion referred to; or if he fails to do this, that he should in common fairness publicly withdraw the injurious accusations he has made against Mr. Crookes and all who are engaged in similar investigations. If this is not done it is equivalent to deciding that no *possible* proof of such phenomena is admissible—a position which is not that of Dr. Carpenter, or, as far as I am aware, of the scientific world generally.

I beg to take this opportunity of apologising for my involuntary appearance under false colours in this month's *Fraser*. The letters "F.R.S." were added to my name after the corrected proofs left my hands and wholly without my knowledge. I have desired the editor to make a statement to this effect in his next issue, but in the meantime wish to set myself right with the readers of NATURE.

ALFRED R. WALLACE

### Nocturnal Increase of Temperature with Elevation

WITH reference to the article in NATURE, vol. xvi. p. 450, on the above subject, allow me to place on record the following facts. On the night of January 7, 1874, in Lucknow, the temperature fell considerably below the usual. The minimum thermometer on the grass at the observatory registered 5° below freezing point. The destruction of plants in the Horticultural Gardens was great. Plantains, pine apples, sugar-cane, mango trees, casuarinas, pomsettias, colvilleas, bugainvilleas, &c., &c., were all injured; some killed outright. The remarkable fact which I observed on that occasion was, that the destruction of vegetation was only up to a certain height, viz., up to between seven and eight feet from the ground. Above that, not a leaf was touched by the frost. On the mango trees especially, which were planted close to each other, it was very remarkable to see a distinct line of destruction along the trees, of seven or eight feet from the ground. This, I think, distinctly showed that the temperature on that night, above eight feet from the ground, was decidedly warmer, and thus protected all vegetation, while all below it was more or less injured, or killed by frost. Other observations, I made lately, corroborate the result of the direct observations made by Mr. Glaisher. During the commencement of October there were several rainy days, with an easterly wind; the total rainfall was under 2½ inches. When it ceased, and the clouds cleared away, I observed the following:—Before seven o'clock in the morning there were only a few low-lying clouds to be seen. As the sun rose, the wind still in the east and almost a calm, clouds began to form in all directions; about noon, and till about 3 P.M., the sky was thickly studded with cumuli of various sizes. After that hour, wider and wider gaps began to form between the clouds, and the dissolving of the cloud-masses continued as the sun approached setting. About two hours after sunset there was scarcely a cloud to be seen, and the twinkling stars came out in their full brilliancy. This melting of the clouds after a certain hour, and completely so after sunset, would, I think, indicate that the cloud region after sunset became decidedly warmer than it had been during the day.

E. BONAVIA

Lucknow, October 22

### Expected High Tides

MR. EDWARD ROBERTS in his letter has, I think, missed the chief object I had in addressing you. I did not complain that the authorities had not taken pains to calculate the heights of the tides, but that while one could take up almost any paper on the coast and find the heights of the tides of the place for the coming week, not one of the London papers, so far as I could find, supplied this information for its readers. What I felt to be a desirable thing was that the Meteorological Office, or some other constituted authority, should send to the daily papers warnings, when necessary, that on such a day a dangerous tide might be expected with a wind from such a quarter and with such a barometer, as the tide would be unusually high under even favourable weather—in fact, give a forecast of the tide.

It is almost useless to ask the public or vestries to put two or three facts together and think out the matter for themselves; they require some authoritative announcement to prepare for danger. And this is the more necessary as an overflow of the Thames at above-average spring tides is, as Mr. Roberts says, now a matter of meteorological circumstances only, and on account of the increased range of the tide in the river.

I was not aware that Captain Saxby had predicted high tides so far back as 1869. If, as Mr. Roberts says, the Astronomer-Royal wrote re-assuring the public that there was nothing extraordinary in the November 3 tide, and as, on the contrary, that tide rose 3 feet 3 inches above Trinity high-water mark, this incident may possibly have had something to do with the establishing of Captain Saxby's reputation with the public as a predictor of tides,

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especially if he had previously predicted the great tide of March 1 of the same year, which rose to 3 feet 7 inches above the mark.

With respect to the actions of the planets, I did not refer to the ordinary tide-producing power, for on working that out some years ago for one of the planets I was somewhat surprised to find that the height was, I believe, a fraction of an inch. I referred rather to the action of that storm-producing power which apparently gives rise to the great atmospheric disturbances at certain times (and, indeed, more or less at all times) in the sun, and by sympathy, or even directly, in our atmosphere.

B. G. JENKINS

### Diffusion Figures in Liquids

PROF. MARTINI describes his diffusion figures as being "both new and singular." In the *Phil. Mag.* for June and November, 1864, I have described and figured various examples of what I call "the submersion figures of liquids" in continuation of a series of papers commenced in 1861 on "The Cohesion Figures of Liquids," or those assumed by liquid drops when delivered to various surfaces. Some of these figures are identical with those given by Mr. Worthington in the *Proceedings* of the Royal Society for 1876, and recently in your pages.

C. TOMLINSON

Highgate, N., December 3

### Bees and Flowers

IN last Thursday's impression (p. 62) is a letter from Mr. H. O. Forbes, referring to bees confining their visits to plants of one kind during each excursion, and thus in a measure preventing hybridisation of plants, &c.

This may be the general habit of bees, but it is not invariable; some bees, more especially their females, are to be found at certain plants only, as *Andrena hattorfiana*, at the scabious *Colletes succincta*, at the heath, and many others in like manner.

I have collected bees for several years, and have often taken them with the pollen-grains varying from orange-red to almost white, and this mixture on the same leg. I have inclosed a slide of pollen-grains which I washed from the leg of an *Andrena nigro-ænea*, and mounted in balsam; this shows several very distinct kinds of pollen; this was mounted in 1875, and at the time I gathered such of the wild flowers as were then in bloom, and compared the pollen. I was able to identify several of them, but as I made no notes I cannot say which. I would advise such observers as intend investigating this very interesting subject, to capture the insects and examine the pollen which may be found on them; this will be difficult in the case of the Bombi and Apis, as they knead it into pellets, but with those which collect on the belly or whole leg it will be easy enough.

Norwich JOHN B. BRIDGMAN

### Hearing in Insects

MY daughter bred this summer a number of the larvæ of *Sphinx ligustri* and *Metopsilus elepenor*, and I was much struck with the extreme sensitiveness to the sound of the voice—especially of the former. The child's treble I observed did not affect them so sharply; but at the first word I uttered they invariably started, and remained some time motionless, with head drawn back, after their manner. I was disposed to attribute it to the vibration set up in objects around by sounds toward the deeper end of the scale, as I have felt a form tremble under me at the deep bass notes of a strong singer; but it had all the appearance and effects of hearing.

HENRY CECIL

Bregner, Bournemouth, December 1

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## *A ZOOLOGICAL STATION FOR THE CHANNEL ISLANDS*

SOME definite prospect at length presents itself of the establishment within British waters of an institution long recognised as a leading desideratum among our Biologists, Museum-Conservators, and Natural History Students, namely, a building with the necessary appurtenances suitably situated, and founded on a somewhat similar basis to that of Dr. Anton Dohrn's noted Zoological Station at Naples, or the Anderson School of Natural History at Penikese Island, Buzzard's Bay, U.S. This long-felt need will be met by the proposed "Channel Islands' Zoological Station and Museum, and Institute of Pisciculture" described at some length in the advertising columns of this journal, and the establishment of which, or a similar institution, has been the guiding star and main object of the writer's ambition during the several years' "apprenticeship" spent by him as Naturalist and Curator to the various leading public aquaria of England.

Successfully carried out, the more prominent features of this undertaking will comprise, as at Naples, in addition to an attractive public exhibition of the living inhabitants of the surrounding waters, laboratories fitted with tanks, tables, and all the necessary instruments and apparatus requisite for the satisfactory prosecution of marine biological research, supplemented by a library replete with the standard scientific works and serials mostly in demand by those occupied in such investigation. Under the same roof it is likewise intended to establish a natural history museum accessible to the public, and more essentially illustrative of the notably rich marine fauna and flora of the Channel Islands. In connection with the library and museum departments popular lectures upon natural history subjects will from time to time be given. Following the system productive of such gratifying results at the Penikese Island Station, it is further proposed for the full development of the scientific advantages of this institution to institute summer classes for the attendance of students, and to hold out sufficient inducements for the most eminent authorities on various biological subjects to deliver lectures and a course of instruction to these classes upon that branch of natural history with which their reputation is more especially associated.

An entirely novel feature to be incorporated with the Channel Islands' Zoological Station will be a department relegated to the conduct of experiments associated with the—in this country—little developed science of economic pisciculture, and in which department it is proposed to award a prominent place to the artificial rearing of lobsters. Experiments made in this direction by the writer some years since at the Manchester Aquarium have decisively shown that the artificial culture of these crustacea on an extended and systematic scale might be developed into a highly important and remunerative industry. In the experiments here referred to it was found that the little lobsters occupied from six to eight weeks in passing through those singular free swimming larval conditions, known respectively as the "Zoea" and "Megalops" stages, antecedent to their assumption of the adult and ambulatory form, and during which short interval they exuviated or cast their shells many times. These initial metamorphoses safely past, their further development to a marketable size, is a comparatively easy task. The scientific culture of the oyster and other edible species will likewise receive attention in association with this undertaking.

The appropriateness of Jersey as a site for this intended Museum of Pisciculture and Zoological Station is at once apparent, the variety and exuberance of the marine fauna of the Channel Islands being such as to assimilate it more closely to that of the Mediterranean than any other one within British waters. The occurrence on the Channel Islands' coast of the Sea Horse (*Hippocampus*), Urchin-fish (*Diodon*), Remora (*Echeneis*), Electric Ray (*Torpedo*), and Lancelet (*Amphioxus*), among the vertebrate group; and of the *Haliotis*, *Scyllarus*, *Comatula*, *Physalia*, *Velella*, *Lucernaria*, and many others among the invertebrate section, are a few from among many that might be named in demonstration of this fact. The sponge-tribe and the division of the tunicate might be likewise specially singled out as attaining upon the shores of these islands a development in both numbers and variety rarely if anywhere else excelled. Unprecedented facilities for the collection of all such marine productions are also afforded by the extraordinary

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